

D. Claims

Please cancel claim 4 without prejudice and amend claims 1-3 and 5-14 as follows. A complete listing of all the claims appears below; this listing replaces all earlier amendments and listings of the claims.

1. (Currently Amended) A liquid ejection head for ejecting a liquid through an ejection ~~orifice~~, orifice comprising:

a recording device board including an energy generating device disposed thereon to generate energy for ejecting the liquid through the ejection orifice;

an electrode pad disposed in a recess formed in the recording device board, the electrode pad being electrically communicated with the energy generating device;

an electrode lead for supplying power to the electrode pad externally of the recording device board;

a plurality of bumps on the recording device board for connecting the electrode pad and the electrode lead to establish electrical communication therebetween, wherein two adjacent bumps are communicated with each other through a communication groove and wherein at least one of the bumps is communicated with an outer peripheral edge of the recording device board; and

a first sealing resin material filled in the recess to surround an electrically connected portion between the electrode pad and the bump without covering the bump.

2. (Currently Amended) ~~A~~ The liquid ejection head according to Claim 1,

wherein the first sealing resin material is a thermosetting resin material having elasticity even after hardening, and ~~another~~ a second sealing resin material, which is another kind of thermosetting resin material having rigidity after hardening, is applied on the ~~first-~~ ~~mentioned~~ first sealing resin material to cover the plurality of bumps and the electrode lead.

3. (Currently Amended) ~~A~~ The liquid ejection head according to Claim 1, wherein a portion of ~~the~~ a bump electrically connected to the electrode lead is projected from the recess.

4. (Cancelled)

5. (Currently Amended) ~~A~~ The liquid ejection head according to Claim 2, wherein the ~~first-mentioned~~ first sealing resin material is a thermosetting silicone-denatured epoxy resin.

6. (Currently Amended) ~~A~~ The liquid ejection head according to Claim ~~1~~ 2, wherein the ~~last-mentioned~~ ~~another~~ second sealing resin material is a thermosetting epoxy resin.

7. (Currently Amended) ~~A~~ The liquid ejection head according to Claim 1, wherein ~~the~~ each bump has an affinitive area having affinity with the sealing resin material and formed nearer to a connection surface thereof to the electrode ~~pad~~ pad and a repellent

area having a lower affinity with the sealing resin material and formed nearer to a connection surface thereof to the electrode lead.

8. (Currently Amended) ~~A~~ The liquid ejection head according to Claim 1, wherein ~~the~~each bump is formed such that a cross-sectional area of the bump parallel to a principal face of the electrode pad is larger in a portion of the bump nearer to a connection surface thereof to the electrode lead than in a portion of the bump nearer to a connection surface thereof to the electrode pad.

9. (Currently Amended) A recording device board used in a liquid ejection head for ejecting a liquid through an ejection ~~orifice~~orifice and including an energy generating device disposed thereon to generate energy for ejecting the liquid through the ejection orifice with electric power supplied from an electrode lead, the recording device board comprising:

an electrode pad disposed in a recess formed in the recording device board, the electrode pad being electrically communicated with the energy generating device; and

a plurality of bumps on the recording device board for receiving the electrical power supplied to the electrode pad through the electrode lead externally of the recording device board,

wherein two adjacent bumps are communicated with each other through a communication groove, wherein at least one of the bumps is communicated with an outer peripheral edge of the recording device board, and wherein each ~~the~~ bump ~~having~~has an

affinitive area having affinity with a sealing resin material and formed nearer to a connection surface thereof to the electrode ~~pad, pad~~ and a repellent area having a lower affinity with the sealing resin material and formed nearer to a connection surface thereof to the electrode lead.

10. (Currently Amended) ~~A~~ The recording device board according to Claim 9, wherein ~~the~~each bump is formed such that a cross-sectional area of the bump parallel to a principal face of the electrode pad is larger in a portion of the bump nearer to a connection surface thereof to the electrode lead than in a portion of the bump nearer to a connection surface thereof to the electrode pad.

11. (Currently Amended) A recording device board used in a liquid ejection head for ejecting a liquid through an ejection ~~orifice,~~orifice and including an energy generating device disposed thereon to generate energy for ejecting the liquid through the ejection orifice with electric power supplied from an electrode lead, the recording device board comprising:

an electrode pad disposed in a recess formed in the recording device board, the electrode pad being electrically communicated with the energy generating device; and

a plurality of bumps on the recording device board for receiving power supplied to the electrode pad through the electrode lead externally of the recording device board,

wherein two adjacent bumps are communicated with each other through a

communication groove, wherein at least one of the bumps is communicated with an outer peripheral edge of the recording device board, and wherein each the bump beingis formed such that a cross-sectional area of the bump parallel to a principal face of the electrode pad is larger in a portion of the bump nearer to a connection surface thereof to the electrode lead than in a portion of the bump nearer to a connection surface thereof to the electrode pad.

12. (Currently Amended) A method of manufacturing a liquid ejection head comprising:

a recording device board including a nozzle member in which an ejection orifice for ejecting a liquid and a flow passage for introducing the liquid to the ejection orifice are formed, and a supply port supplied with the liquid to be ejected through the ejection orifice;

a flexible film wiring board including an opening in which the recording device board is assembled, and an electrode lead provided near the opening for electrical connection to the recording device board, the flexible film wiring board applying an electrical pulse for ejecting the liquid to the recording device board;

a support member for supporting the recording device board;

a support plate having an opening through which the recording device board and the support member are abutted with each other, the support plate being interposed between the flexible film wiring board and the support member to support the flexible film wiring board; and

first and second sealing resin materials filled in ~~recessed~~recesses defined by

the opening of the flexible film wiring board, the opening of the support plate, and an outer periphery of the recording device board, the method comprising the steps of:

~~a first step of~~ fixedly bonding the recording device board to the support member and fixedly bonding the flexible film wiring board to the support plate;

~~a second step of~~ filling a first sealing resin material, which is a thermosetting resin material having elasticity after hardening, in the recesses, and of filling and hardening the first sealing resin material in a first sealing resin material reservoir formed to surround an electrically connected portion between each of a plurality of bumps on the recording device board and an electrode pad provided on the recording device board, wherein two adjacent bumps are communicated with each other through a communication groove and wherein at least one of the bumps is communicated with an outer peripheral edge of the recording device board;

~~a third step of~~ electrically connecting the electrode pad on the recording device board to the electrode lead of the flexible film wiring board through the plurality of bumps; and

~~a fourth step of~~ covering an electrically connected portion between the recording device board and the flexible film wiring board with a second sealing resin material which is a thermosetting resin material having rigidity after hardening.

13. (Currently Amended) ~~A~~ The method of manufacturing a liquid ejection head according to Claim 12, wherein connection points between the ~~a~~ recording device board and the flexible film wiring board are all electrically connected at a time.

14. (Currently Amended) ~~A~~ The method of manufacturing a liquid ejection head according to Claim 12, wherein connection points between the a recording device board and the flexible film wiring board are electrically connected one by one.